

# Investigation

## 1

## Variables, Tables, and Coordinate Graphs

**T**he bicycle was invented in 1791. People of all ages use bicycles for transportation and sport. Many people spend their vacations taking organized bicycle tours.

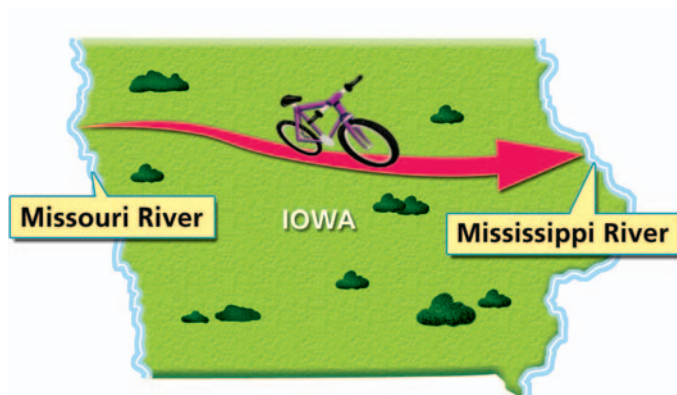


### Did You Know?

RAGBRAI, which stands for Register's Annual Great Bicycle Ride Across Iowa, is a weeklong cycling tour across the state of Iowa. The event has been held every summer since 1973. Although the tour follows a different route each year, it always begins with as many as 10,000 participants dipping their back bicycle wheels into the Missouri River along Iowa's western border and ends with the riders dipping their front wheels into the Mississippi River on Iowa's eastern border.

**Go Online**  
PHSchool.com

For: Information about RAGBRAI  
Web Code: ane-9031

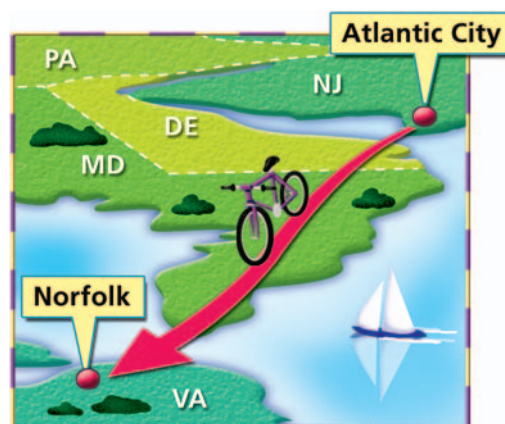


# 1.1

## Preparing for a Bicycle Tour

**S**idney, Celia, Liz, Malcolm, and Theo decide to operate bicycle tours as a summer business. The five college students choose a route from Atlantic City, New Jersey, to Norfolk, Virginia. The students name their business Ocean Bike Tours.

While planning their bike tour, the students need to determine how far the touring group can ride each day. To figure this out, they take test rides around their hometowns.



### Getting Ready for Problem 1.1

- How far do you think you could ride in a day?
- How do you think the speed of your ride would change during the course of the day?
- What conditions would affect the speed and distance you could ride?

To accurately answer the questions above, you would need to take a test ride yourself. Instead you can perform an experiment involving jumping jacks. This experiment should give you some idea of the patterns commonly seen in tests of endurance.

### Jumping Jack Experiment

You will need a group of at least four people:

- a jumper (to do jumping jacks)
- a timer (to keep track of the time)
- a counter (to count jumping jacks)
- a recorder (to write down the number of jumping jacks)

As a group, decide who will do each task.

When the timer says “go,” the jumper begins doing jumping jacks. The jumper continues jumping for 2 minutes. The counter counts the jumping jacks out loud. Every 10 seconds, the timer says “time” and the recorder records the total number of jumping jacks the jumper has done.

## Problem 1.1 Interpreting Tables

- A. Do the jumping jack experiment. For each jumper, prepare a table for recording the total number of jumping jacks after every 10 seconds, up to a total time of 2 minutes (120 seconds).

**Jumping Jack Experiment**

Time (seconds)	0	10	20	30	40	50	60	70	...
Total Number of Jumping Jacks									

Use the table of your jumping jack data to answer these questions:

- B. How did the jumping jack rates (the number of jumping jacks per second) in your group change as time passed? How is this shown in your tables?
- C. What might this pattern suggest about how bike-riding speed would change over a day's time on the bicycle tour?

**ACE** Homework starts on page 15.



## 1.2 Making Graphs

In the jumping jack experiment, the number of jumping jacks and the time are variables. A **variable** is a quantity that changes or varies. You recorded data for the experiment variables in a table. Another way to display your data is in a **coordinate graph**. Making a coordinate graph is a way to show the relationships between two variables.